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and protecting friend of Lobachevsky, confirms the supposition that the first impulse to these studies came to him, at least indirectly, from Gauss. To the same source of inspiration must be traced the almost simultaneous, but independent, researches of the Hungarian Wolfgang Bolyai and his son Johann. Gauss himself never published anything on the subject of non-Euclidean geometry; but we know from his letters to Schumacher that he had spent much thought on these questions, which had occupied him from his earliest youth, and had arrived at practically the same results as Lobachevsky and the Bolyais.

In the later development of non-Euclidean geometry and the closely related theory of  $n$ -dimensional spaces or manifoldnesses we find among others the names of Grassmann, Riemann, Helmholtz, Cayley, Klein, Lie; and in these the uninitiated may find a sufficient guarantee for the value of the subject.

In conclusion, a few words must be said of the present English translation. The original has been followed so faithfully that anybody possessed of an adequate knowledge of the Russian language will understand the translation very readily. The reading of such unidiomatic English is, however, exceedingly painful. Were it not for the direct statement on the title-page, we should never have ascribed this translation to Professor Halsted, whose vigorous command of the English language is well known. It seems almost incredible that a person whose native language is English should have written, or even passed in the proof, such sentences as these: (p. 3) "So in celebrating this day to Lobachevsky, we must remember with gratitude his teachers." (ib.) "His destiny was to be the teacher and protector not only of Lobachevsky, but of the scientist of our century most influential on the development of mathematics, Gauss." (ib.) "The mathe-

matical ability of the boy-genius awakened the attention of the science-hungry Bartels." (p. 4.) "... he received the grade of 'Magister' July 10, 1811, for extraordinary advance in mathematics and physics." (ib.) "... the question of the lowering of the grade of a two-termed equation ..."

The transliteration of Russian names is faulty and inconsistent; thus we find Pouchkin for Pushkin, Demidef for Demidov, Karamzen for Karamzin, Simenov for Simónov, etc. It is inconceivable why the name of the well-known astronomer Littrow should be persistently misspelled Lettroy. On p. 1, for 'November 9, 1807' read 'January 9, 1807.' The statement in the preface, p. vii., that "in 1500 Copernicus was enjoying the friendship of Regiomontanus and fulfilling with distinction the duties of a chair of mathematics" is singularly incorrect. Regiomontanus died in 1476, when Copernicus was three years of age; and, although Rhæticus, in speaking of the residence at Rome in 1500, refers to Copernicus as 'professor mathematicum,' it is now, in the absence of any direct evidence, generally accepted that the author of the *De revolutionibus* was never connected as teacher with any scientific institution.

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*Laboratory Exercises in Botany*, designed for the use of colleges and other schools in which Botany is taught by laboratory methods, by EDSON S. BASTIN, Am. Professor of Materia Medica and Botany and Director of the Microscopical Laboratory in the Philadelphia College of Pharmacy. Philadelphia. 1895. \$2.50.

In a review of this volume it should be considered for whom it was written and from that standpoint an estimate should be made whether the purpose has been really accomplished. Being designed for students who are beginners, it leads them from the simple to the complex, and does it, we think,

in a very satisfactory manner. As a laboratory guide the work is perhaps a little too voluminous, 540 pages. It is divided into two portions, the first requiring work with the simple microscope, and consists of a series of lessons inductively arranged, which leads the student from a study of the root through the types of the largest families to a study of the seed and embryo. They are designed to give to the student a familiarity with the various forms, without burdening him with the technical descriptive terms, which are, however, summed up in tabulated plates for reference. The full-page illustrations of the first portion are numerous, very simple, excellently drawn and well printed.

The second portion of the volume, 270 pages, on vegetable histology, opens with a chapter on the compound microscope and the use of micro-chemical reagents, and is accompanied by excellent and practical tables of reagents and stains. The purpose of this volume limits its scope. It makes a good working guide to put into the hands of students who can give but a limited time to the study, but further than that, as a work upon vegetable histology, it is meagre.

The arrangement of this portion of the work is less commendable than the first. Its numerous illustrations can be classed as most good, few bad and a number indifferent, in general the simple elements of tissues being good, whereas those showing the tissues themselves, especially the more complex ones, are less to be approved.

The work is one which is admirably adapted for the use of students in pharmacy, for which it was probably first intended, and in the hands of a guide whose methods were similar to those of the writer, we conceive it to be excellent. In general its scope is limited; it gives facts but fails, we think, to point out those logical sequences of growth and development that lead the student to a rounded conception of the science of botany ;

it nevertheless is by far the best laboratory guide we have seen for directors of laboratories who wish to give their students a practical elementary knowledge of botany.

S. E. JELLIFFE.

*Principles and Practice of Agricultural Analysis.*—BY HARVEY W. WILEY, Chemist of the U. S. Dept. of Agriculture.—Easton, Chemical Publishing Co., 1894. Vol. I.

We have already called attention to the first part of this admirable work, now being published in monthly installments by the Chemical Publishing Company, and need not again speak of its general excellence of plan. If any fault is to be found with the work it is with its limited title, which is rather apt to mislead some into a supposition that the book will be of service only to the analyst, and as a laboratory manual alone. The twelve parts which have now appeared, nearly 600 pages in all, indicate a work of much broader scope, one which no scientific library can afford to omit from its catalogue. Of the first of the series we have already spoken. In No. 2 the subject of soils and soil formation is continued, the action of earth-worms, bacteria, air, etc., the qualities of the various soils and the discussion of certain peculiar soil types. An interesting chapter on sampling follows, and here is discussed in principle and practice all of the accepted methods now in use in various countries and among the leading workers in agricultural science. The study of the physical properties of soils and the description of methods of mechanical and microscopical analysis, etc., occupies some 200 pages, while the methods of chemical analysis, begun in No. 7 of the series, extends to the present issue. We know of no other work approaching the present in completeness and scientific value. The exhaustive treatment of the subject leaves nothing to be desired, and it would be difficult indeed to criticise any of its features. At the end